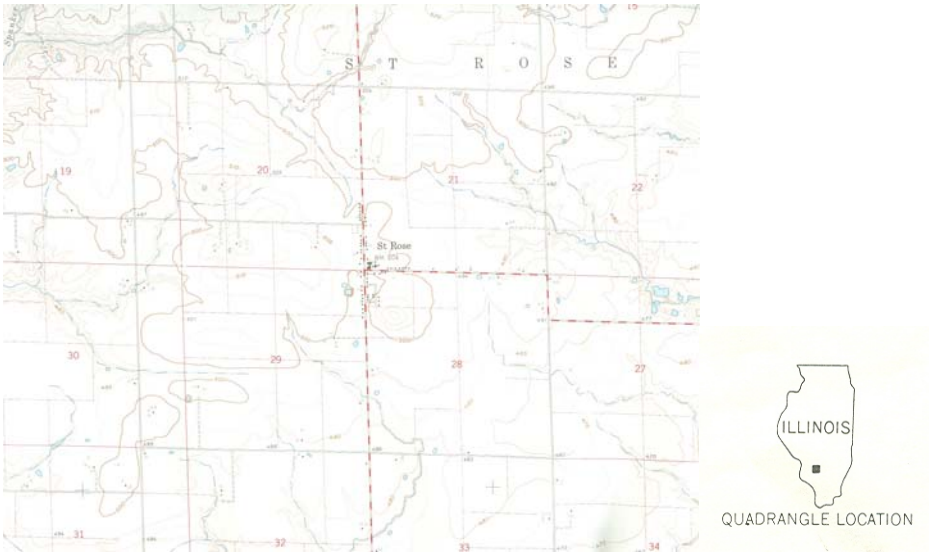
Midwest Technology Assistance Center
Groundwater Resource Assessment for Small Communities

Groundwater Availability
At
St. Rose PWD, Illinois
(Clinton County)

Project Overview
This project is an outgrowth of the Public Service Program of the Center for Groundwater Science (CGS) at the Illinois State Water Survey. For over 50 years, the CGS has provided groundwater information to any requesting individual, commercial facility or public water facility. Groundwater resource assessments have been an integral part of this public service and have been undertaken for thousands of individuals and facilities throughout its history. Community groundwater supplies that have been identified as potentially "deficient" and "marginal" are the targets for this project. The criterion used for determining community deficiency were; 1) Water Supply and Demand (operating time), 2) Aquifer Limitation, 3) Well Specific Capacity, and 4) Facility History. The Village of St. Rose PWD has been identified as a target community for groundwater assessment through this project.

Project Goal
To provide a resource tool of pertinent groundwater information to each target facility. This document describes a summary of historic information, current conditions and the potential for expansion of the water supply within 5 and 10 miles of St. Rose PWD.

St. Rose PWD (Clinton County)



The St. Rose Public Water District (Facility Number 0275250) utilizes four active community water supply wells. Wells #1, 2, 3, and 4 (Illinois EPA #00582, 00583, 01043, and 01240, respectively) supply an average of 219,000 gallons per day (gpd) to 450 services or a population of 1,600. The District has and continues to purchase water from the City of Breese located about 5 miles to the south of St. Rose. Since 1989, St. Rose Public Water District has been providing a portion of their needs from their own wells. Over the last nine years, the city has averaged about 50 percent production from their own water wells.

The project criterion ranked St. Rose PWD as "marginal" mainly due to its shallow water table wells, a history of searching for groundwater in areas with marginal results, and the problems associated with those searches due to the highly variable sand formations found throughout this area.

Historic Information

Background Well Information

Well No.1

Finished in shallow sand and gravel deposits associated with Shoal Creek, located approximately 5 miles northeast of the Village of St. Rose in Section 27, T.4N., R.4W., Bond County. The well was drilled to a depth of 36 feet in 1988 and, during the production test (1989), the well was pumped at a rate of 98 gallons per minute (gpm) for 180 minutes. The water level declined by 3.98 feet from a static level of 25.35 feet below land surface.

Well No.2

Finished in shallow sand and gravel deposits located in Section 26, T. 4N., R.4W., Bond County. The well was drilled to a depth of 26 feet in 1989. Upon completion, the well was pumped at a rate of 71 gpm for 180 minutes with a drawdown of 7.99 feet from a static water level of 5.14 feet below land surface.

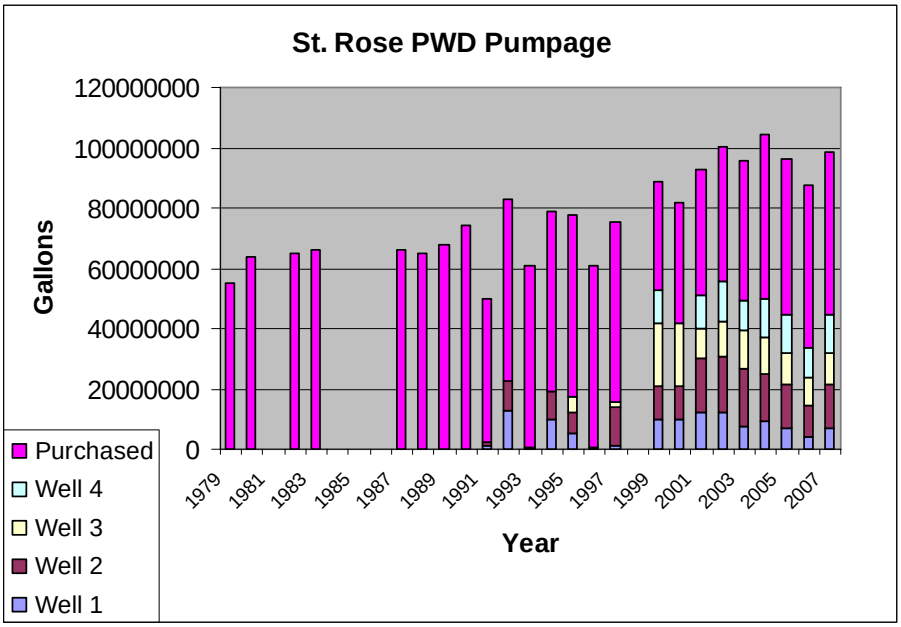
Well No.3

Finished in shallow sand and gravel deposits located in Section 26, T. 4N., R.4W., Bond County. The well was drilled to a depth of 42 feet in 1994. Upon completion, the well was fitted with a 50 gpm capacity pump.

Well No.4

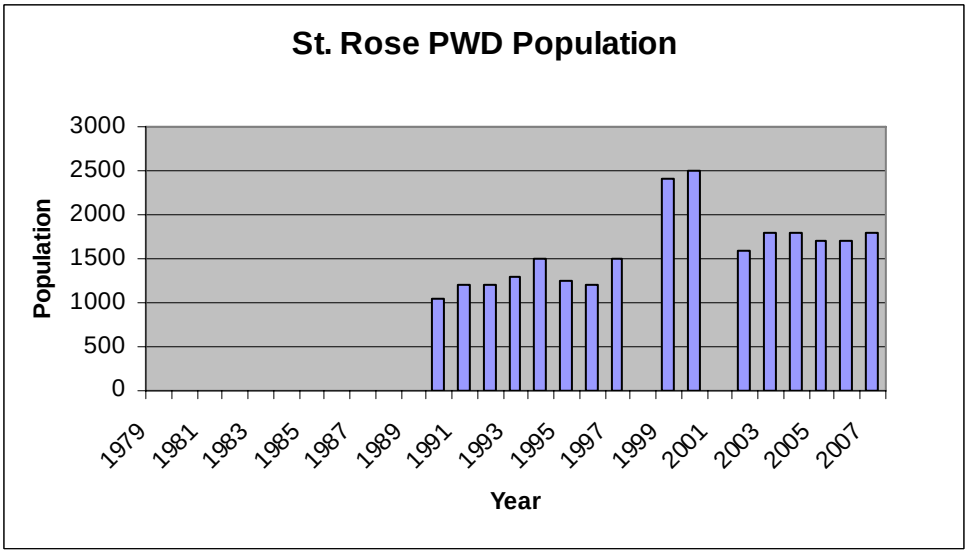
Finished in shallow sand and gravel deposits located in Section 20, T. 2N., R.4W., Clinton County. This well was constructed on the Ratermann Farm which is west of Central High School along Route 50 (approximately 5 miles south of St. Rose). The well was drilled to a depth of 40 feet in 1995. Upon completion, the well was fitted with a 70 gpm capacity pump.

Background Pumpage Information



Source: ISWS Illinois Water Inventory Program

Historic Population Information



Source: ISWS Illinois Water Inventory Program

Regional Information

Resources within 5 miles of St. Rose PWD (Figure 1).

Domestic Groundwater Supplies
The available regional data indicate that groundwater for domestic and farm use in this part of Illinois is obtained from large-diameter dug and bored wells, small-diameter drilled wells finished in the unconsolidated materials above bedrock, as well as small-diameter drilled wells finished within the bedrock units. The large-diameter dug and bored wells tap stringers or lenses of silt, sand, or gravel only a few inches thick contained in the unconsolidated materials above bedrock. They range in depth from about 14 to 64 feet. The yield of this type of well is limited to a few hundred gallons per day and may be only barely adequate for normal household uses. Some drilling attempts into both the unconsolidated materials and the shallow bedrock have reported dry hole conditions in this area.

The small-diameter (4- to 6-inch) drilled wells that are finished within sand and gravel deposits found within the unconsolidated material above bedrock range in depth from 28 to 45 feet. Upon completion, these wells were pumped at rates of 3 to 50 gallons per minute for short periods of time.

The small-diameter (4- to 6-inch) drilled wells that are finished within bedrock tap limestone and sandstone deposits found within the upper bedrock in this area. These wells range in depth from 52 to 175 feet below land surface. Upon completion, these wells were pumped at rates of 3 to 10 gallons per minute for short periods of time.

Municipal Groundwater Supplies
There is one town located within five miles of the St. Rose; the town of Jamestown to the northeast. This town does not have a public water supply system and it is presumed that private wells are used for the citizen's water needs.

Resources within 10 miles of St. Rose PWD (Figure 2).

Municipal Groundwater Supplies
Towns within 5 to 10 miles of St. Rose PWD include: Pocahontas and Pierron in Bond County, Highland and St. Morgan in Madison County, and Aviston, Breese, Beckemeyer, and Germantown, all within Clinton County. Pierron and St. Morgan do not have public water supply systems. Pierron buys their water from the City of Highland and it is assumed that private domestic wells furnish the residents of St. Morgan with their current water needs.

The Village of Pocahontas, located about 5 miles north of the St. Rose PWD north well field, at one time used shallow wells associated with Shoal Creek. Since 1999 they have purchased water from Illinois-American Water through the

Bond-Madison Water Company pipeline. Limited information is available from our files but reports indicate low pumping rates combined with poor water quality (high iron concentrations) led the city to abandon their wells and purchase their water.

The Cities of Highland (Madison Co.) and Breese (Clinton Co.) currently use two reservoirs each, for their water supply. The Highland reservoir system has a capacity of 121 million gallons and the Breese system has a capacity of approximately 11 million gallons.

The Village of Aviston currently uses three wells (Nos. 1, 2, and 3) for their supply. The village also has a connection to the City of Breese water supply for emergency purposes. Wells 1 and 2 are located in Section 19, T.2N., R.4W., Clinton County and Well 3 is located in Section 25, T.2N., R.5W., Clinton County. All the wells are finished in sand and gravel deposits at depths of 74, 67, and 77 feet, respectively. The wells have the capacities ranging from 150 to 200 gpm for their water needs.

The Village of Beckemeyer purchases its water from the Carlyle Public Water System which gets its water from Carlyle Lake.

The City of Germantown uses four wells (Nos. 2, 3, 4, and 5) and purchase water for their supply. The wells are all located in Section 4, T.1N., R.4W., Clinton County. They range in depth from 25 to 29 feet below land surface and are finished in thin sand deposits in and around the city limits. The city also purchases about one-third of their supply from the Breese Public Water District.

Figures 3 and 4 picture the ISWS Potential Yield maps for sand and gravel and bedrock aquifers in Illinois, respectively. The pertinent counties for St. Rose PWD are highlighted. Figure 3 indicates that sand and gravel deposits are variable throughout the St. Rose PWD area with major sand deposits associated along the Kaskaskia River to the south and the Beaver Flat Branch of this same river to the east. The bedrock map (Figure 4) indicates poor availability of groundwater from the bedrock throughout the St. Rose PWD area. Figures 5 and 6 present the probability of occurrence of the sand and gravel and the water-yielding character of the shallow bedrock for the St. Rose PWD area as depicted in the Illinois State Geologic Survey Circular 225, *Groundwater Geology in South-Central Illinois* (Selkregg, et al., 1957). Figure 5 indicates “Fair to Good,” variable and discontinuous sand and gravel deposits and Figure 6 indicates only small supplies are available from the shallow bedrock units. The domestic well construction records, as well as the Water Districts own search for groundwater supplies, verify these map outlooks.

Figure 1. 5-mile radius map- St. Rose PWD

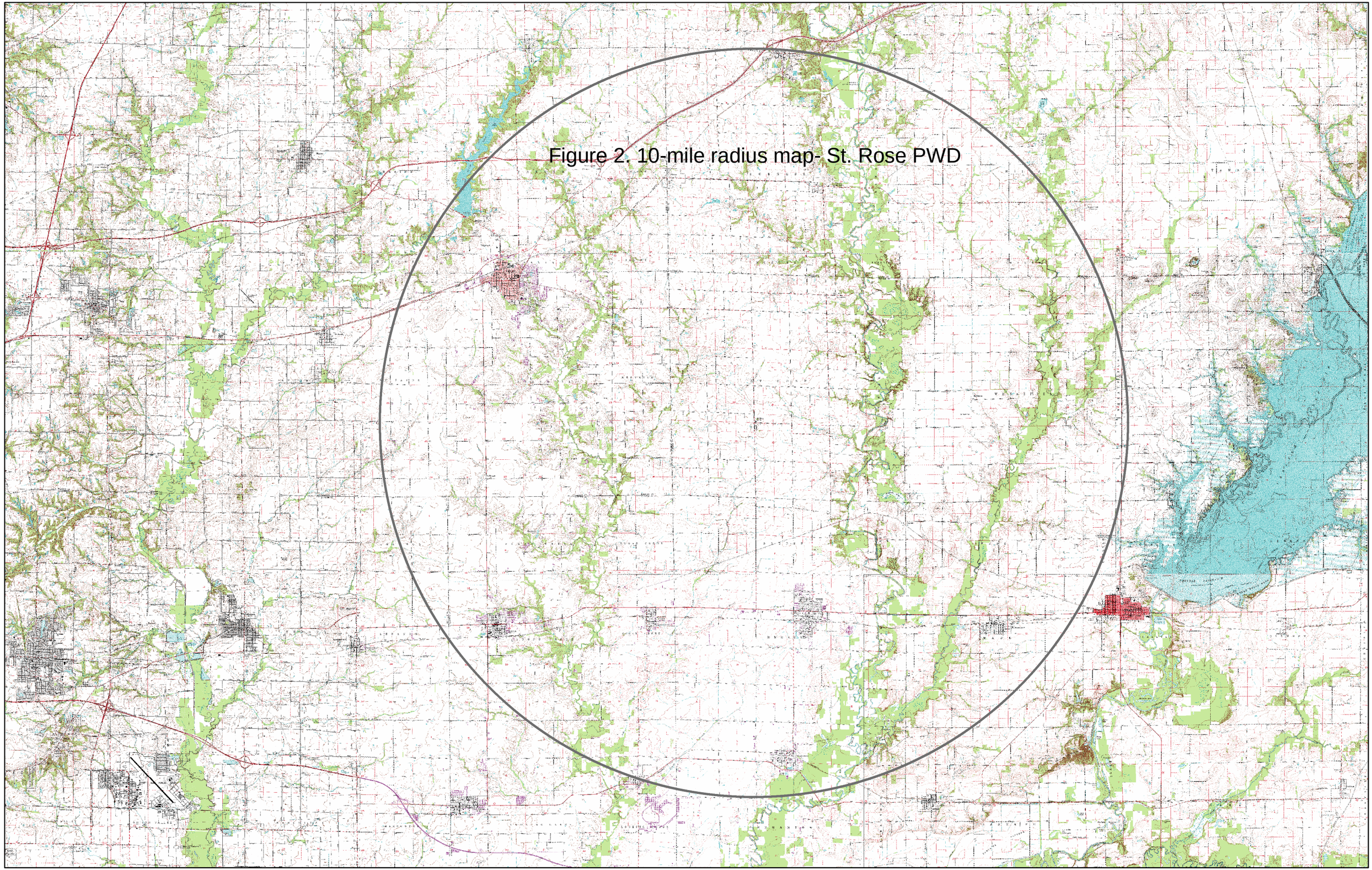


Figure 2. 10-mile radius map- St. Rose PWD

Groundwater Availability Summary

The available information indicates the sand and gravel deposits that the village uses are capable of supplying about half of the current needs of the town. The connection to the Breese water supply has the potential to supply the village with any additional water that it may need in the future. The Breese reservoir has the capacity to handle additional volumes of water for the area. However, over the last few years it is reported that the City of Breese has increased their fees for supplying water to the point where some users have looked to increase or expand their own water supplies as an alternative to paying Breese increased rates. If the St. Rose PWD is interested in expanding their groundwater supply, the available information indicates there are a few options available.

It is clear from numerous groundwater exploration reports that the geology in this area can vary greatly over small distances. Sands and gravel deposits are present but their thickness and extent make them unreliable as long-term groundwater sources. Developing new wells within a few hundred feet of the existing well field may not be in the best interests of securing a long-term solution for new development. The existing north well field has very shallow sand deposits and constructing additional wells in the same location may impact production of the entire aquifer system. However, a 1990 Electrical Earth Resistivity report indicated that a location about ½ mile southeast of Well No.3 had some potential for development (along the south section line of Section 17). Exploration to the east, closer to Shoal Creek may be the least costly approach to expanding the current well field. It does appear, however, that there are other sands in the general St. Rose area that have the potential for development.

The one area that has the highest potential and has been explored in the past is in Section 17, T.3N., R.3W., Clinton County (approximately 5 miles east, northeast of the village). In 1981, a test well was constructed and a production test was run by the village with the help of the Illinois State Water Survey. The well was finished at a depth of 60.7 feet and reported about 30 feet of water bearing sand. The non-pumping water level was measured at 9.12 feet below land surface. The well was pumped for 6 hours at a constant rate of 200 gallons per minute with a drawdown of about 5 feet over the course of the test. The estimated long-term production rate of this well was determined to be approximately 200 gpm. It is unclear as to why this site was never developed for a village water supply; however, the potential for these deposits to supply the village appears to be high.

One other area that was could be explored would be the area around Well No. 4 (Section 20, T.2N., R.4W., Clinton Co.). This area has potential for groundwater production based upon the construction of Well No. 4 and the Village of Aviston well field, located about 1 mile west. The Aviston wells have capacities ranging from 150 to 200 gpm and appear to be a viable option for St. Rose. Test drilling and production testing would be required to determine potential for this area.

This may be the most cost effective because the water line from Well No. 4 is in close proximity.

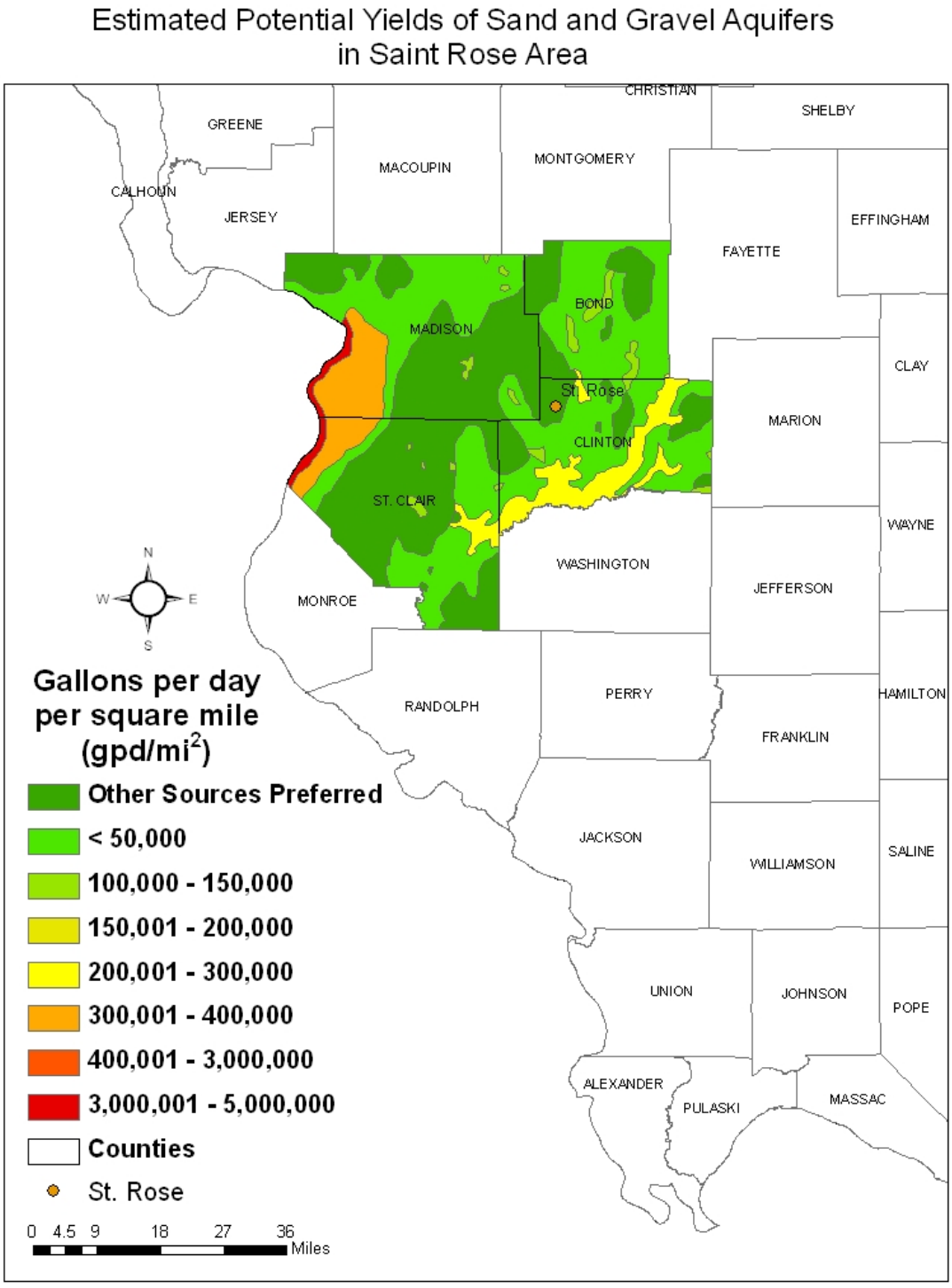


Figure 3.

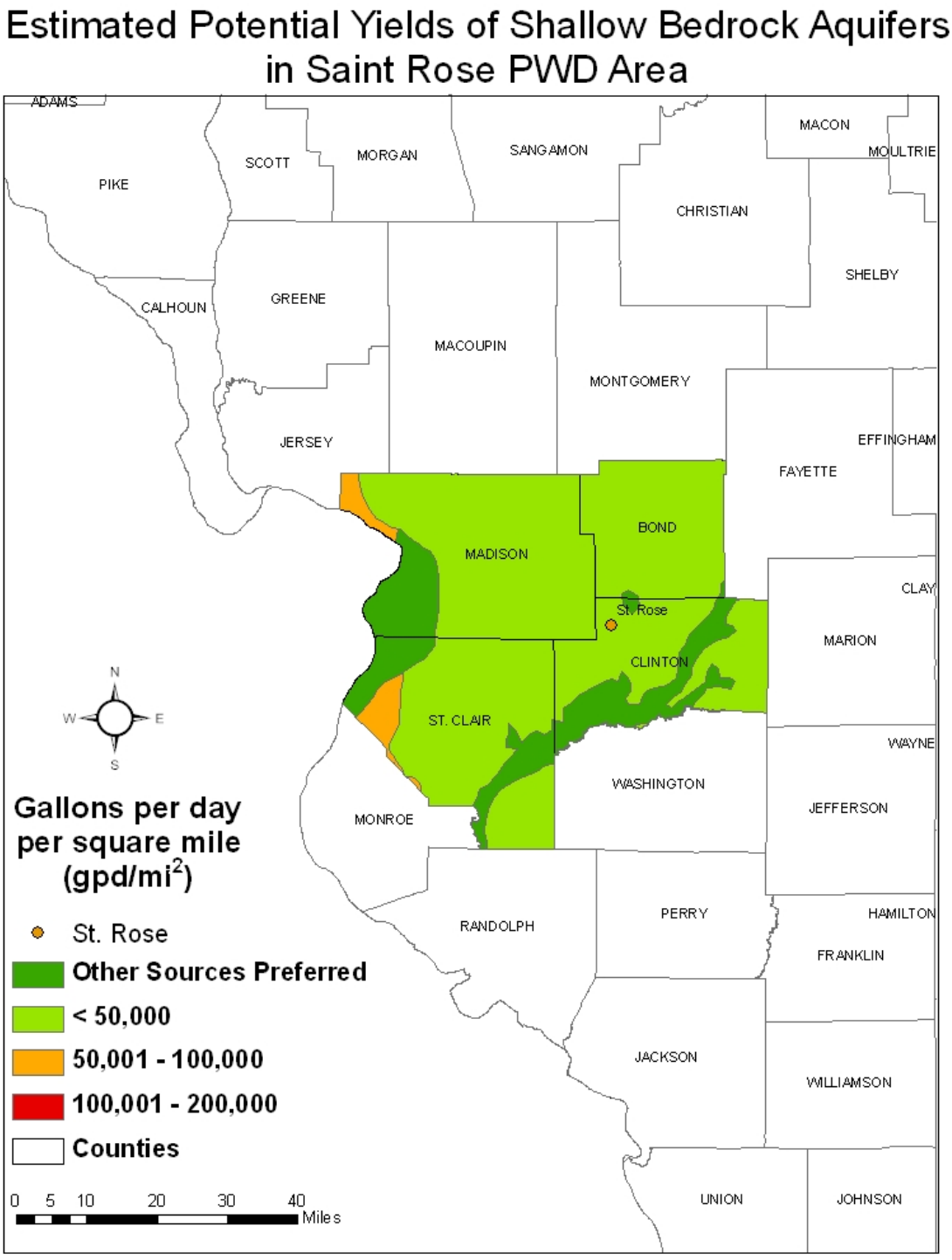

Estimated Potential Yields of Shallow Bedrock Aquifers in Saint Rose PWD Area
ADAMS
PIKE
SCOTT
MORGAN
SANGAMON
MACON
MOULTRIE
CHRISTIAN
SHELBY
CALHOUN
GREENE
MACOUPIN
MONTGOMERY
JERSEY
EFFINGHAM
FAYETTE
BOND
MADISON
CLAY
St. Rose
MARION
CLINTON
ST. CLAIR
WAYNE
WASHINGTON
JEFFERSON
MONROE
RANDOLPH
PERRY
HAMILTON
FRANKLIN
JACKSON
WILLIAMSON
UNION
JOHNSON
N
W
E
S
Gallons per day per square mile (gpd/mi2)
St. Rose
Other Sources Preferred
< 50,000
50,001 - 100,000
100,001 - 200,000
Counties
0 5 10 20 30 40
Miles

Figure 4.

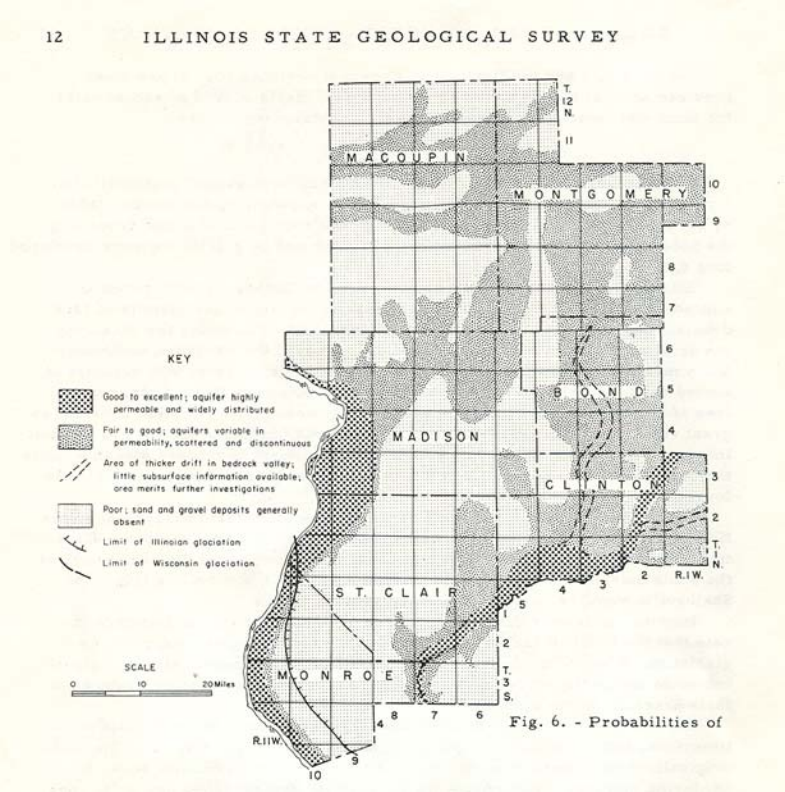


Figure 5.

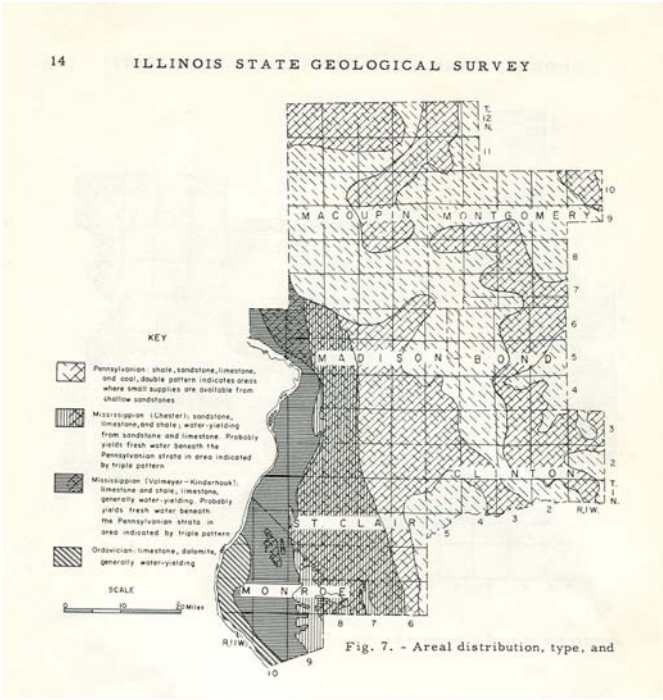


Figure 6.

References

Selkregg, L.F., J. Kempton, and W. Pryor. 1957. Groundwater Geology In South-Central Illinois, A preliminary Geologic Report. Illinois State Geological Survey Circular 225.

ISWS publications list for the St. Rose PWD and surrounding areas.

BOND

*1966	RI-55	Yields of wells in Pennsylvanian and Mississippian rocks in Illinois. Csallany. 42p.
1972	RI-70	Plans for meeting water requirements in the Kaskaskia River Basin, 1970-2020. Singh-Visocky-Lonnquist. 24p.
1973	B-60-3	Public groundwater supplies in Bond County. Woller. 9p.

CLINTON

*1966	RI-55	Yields of wells in Pennsylvanian and Mississippian rocks in Illinois. Csallany. 42p.
1972	RI-70	Plans for meeting water requirements in the Kaskaskia River Basin, 1970-2020. Singh-Visocky-Lonnquist. 24p.
*1980	CR-237	Assessment of eighteen public groundwater supplies in Illinois. Wehrmann-Visocky-Burris-Ringler-Brower. 185p.